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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/820,272

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Tatsuo Suemasu

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HOFFMANN & BARON, LLP
6900 JERICHO TURNPIKE
SYOSSET, NY 11791

EXAMINER

BAREFORD, KATHERINE A

ART UNIT

PAPER NUMBER

1762

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DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/820,272

Applicant(s)

SUEMASU ET AL.

Examiner

Katherine A. Bareford

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 June 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Claims 6 and 7 are canceled

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☒ Certified copies of the priority documents have been received in Application No. 10/247,264.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 4/04, 3/06, 2/07, 5/07.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

DETAILED ACTION

1. The preliminary amendment of June 1, 2004 has been received and entered. With the entry of the amendment, claims 6 and 7 are canceled and claims 1-5 and new claim 8 are pending for examination.

Specification

2. The disclosure is objected to because of the following informalities: at page 1, in the reference to 10/247,264, it should be clarified that this application is now U.S. Patent No. 6,743,499.

Appropriate correction is required.

Double Patenting

3. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

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Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

4. Claims 1 and 4 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 2 and 4-7 of copending Application No. 11/739,575. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of 11/739,575 provide all the features of claims 1 and 4 of the present application, including forming the hole partway through the substrate (claims 1), forming a metal layer on an inner surface of the hole (claims 6,7), filling the hole with molten metal (claims 2, 4, 5), except that the hole is a "fine" hole, however, it would be inclusive of such a size, because there are no limitations on the size of the hole in 11/739,575. While the claims of 11/739,575 also provides other features, these are not prevented by the wording of the present claims of this application.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1-5 and 8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1, line 2, a "fine" hole is claimed, however, it is unclear what size is required for a hole to be considered "fine" rather than "large" or "not fine" or that this necessarily even refers to size, as it could also refer to quality of some sort.

Claim 3, line 13, "said outer surface" lacks antecedent basis.

The other dependent claims also refer to the use of a "fine" hole and do not cure the defects of claim 1 as to clarifying the meaning of the term or the other defects of the claims from which they depend.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1 and 4 are rejected under 35 U.S.C. 102(b) as being anticipated by Schneble, Jr. et al (US 3628999).

Schneble teaches a metal filling method. Column 4, lines 40-75. A fine hole is formed in a workpiece. Column 4, lines 55-60 (holes 28), column 6, lines 5-15 and column 1, lines 65-75 (the holes would have "extremely small" or "fine" diameter) and figure 1E. Then a metal layer is formed on at least an inner surface of one end of the fine hole. Column 4, lines 55-65 (deposit 30) and figure 1F. Then a third step of filling a molten metal into the fine hole is provided. Column 4, lines 65-75, column 5, lines 25-30 (solder would be metal) and Figure 1H (see 34).

Claim 4: the workpiece is a substrate. Column 4, lines 40-75 (the board base 10 with its layers) and figures 1E. The fine hole is not required to pass entirely through the substrate, but can only open to the top surface of the substrate. Figure 1E and column 4, lines 55-60 (holes extending into the board).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were

made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claim 2, 3, 5 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schneble as applied to claims 1 and 4 above, and further in view of Klehm, Jr. (US 3755890).

Schneble teaches all the features of these claims except (1) that the fine hole is a through hole that extends through the workpiece (claim 2, 8), (2) that the metal filling method further comprises closing at least one of two openings (claim 2), (3) the removing of the workpiece out of the molten metal (claim 2, 3), (4) solidifying the molten metal (claim 3). Schneble does teach that the metal layer is formed on the inner surface of at least the top end of the hole. Figure 1G and column 4, lines 60-70. Schneble also teaches that solder is plated by dipping (immersing) into a solder bath (which would be molten) and the solder metal is filled into the hole from the dipping. Column 2, lines 1-10, column 4, lines 65-75, column 5, lines 20-60. Schneble further teaches forming the metal layer 30 on the outer surface of the workpiece around the opening in said one end. See Figure 1F and column 4, lines 60-70 (lands 32). Schneble further teaches that a padding portion united with the molten metal (solder) is formed on the

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metal layer on the outer surface of the workpiece. See figure 1H and column 4, lines 70-75 and column 5, lines 50-60. The shape of the metal layer formed on the outer surface of the workpiece is patterned to correspond to a shape of the padding portion to be formed. See figure 1H and column 4, lines 70-75 and column 5, lines 50-60 (the solder metal applies to the lands 32 forming the shape of the padding portion). Schneble also refers to forming treated through holes for circuit boards (column 2, lines 40-50) and that two sided boards can be formed and used (column 4, lines 40-46).

However, Klehm teaches that it is well known that through holes for circuit boards commonly have are provided by forming holes in the board that open out through the opposite surface, and that these holes are commonly plated with a metal layer such as copper and then liquid solder is introduced into the plated through holes which would later solidify therein to provide a reliable electrical path between the opposite surfaces of the board. Column 2, lines 5-10, column 3, lines 50-68 and column 5, lines 30-40 and figure 5 (showing a through hole passing through the entire board 10 with two openings). The solder is introduced into the through hole to fill the hole and provide a solid fillet in each hole for improving the electrical connection and desirably completely fills the plated through hole in a solid body. Column 4, lines 1-5, column 5, lines 34-40 and figure 5.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to (1) modify Schneble to provide that the fine hole is a through hole that extends through the workpiece with openings in the top and bottom surfaces

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of the workpiece as suggested by Klehm with an expectation of desirable treatment of a circuit board, because Schneble teaches that the process applies to through holes for circuit boards, and Klehm teaches that through holes for circuit boards commonly extend through the workpiece with openings in the top and bottom surfaces of the workpiece and that the entire hole is to be plated and filled with the solder metal. It further would have been obvious to (3) (4) modify Schneble to remove the workpiece from the molten metal bath and solidify the molten metal as suggested by Klehm in order to have a desirable treated circuit board for use, because Schneble teaches the formation of circuit boards, to dip the workpiece in molten solder, and demonstrates the result of a plated article, indicating that the article must be removed from the molten solder bath for final use and furthermore the molten solder would solidify after removed from the bath, because it was no longer heated, as is also shown by Klehm which indicates that it is desired for the solder to solidify, which would occur after leaving the bath. It further would have been obvious to (2) modify Schneble to provide that the metal filling method further comprise closing at least one of two openings of said through hole as suggested by Klehm in order to have a desirable filled through hole, because Schneble teaches providing molten solder in the through hole, and Klehm teaches that it is desired for the solder to solidify and fill the through hole, thus indicating that the metal filling method would "close" the opening in the through hole by filling it entirely with solder.

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12. Kwon et al (US 6376279) also shows filling via holes with a metal layer filled with molten solder. Column 4, line 60 through column 5, line 15 and figure 19.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine A. Bareford whose telephone number is (571) 272-1413. The examiner can normally be reached on M-F(6:00-3:30) with the First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone numbers for the organization where this application or proceeding is assigned are (571) 273-8300 for regular communications and for After Final communications.

Other inquiries can be directed to the Tech Center 1700 telephone number at (571) 272-1700.

Furthermore, information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


KATHERINE BAREFORD
PRIMARY EXAMINER